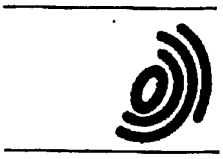

Europäisches Patentamt | European Patent Office | Office européen des brevets

12 JUL 2004

Bescheinigung | Certificate | Attestation

Die angehefteten Unterlagen stimmen mit der ursprünglich eingereichten Fassung der auf dem nächsten Blatt bezeichneten europäischen Patentanmeldung überein.

The attached documents are exact copies of the European patent application described on the following page, as originally filed.

Les documents fixés à cette attestation sont conformes à la version initialement déposée de la demande de brevet européen spécifiée à la page suivante.

Patentanmeldung Nr. Patent application No. Demande de brevet n°

03102180.1

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN COMPLIANCE WITH RULE 17.1(a) OR (b)

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
p.o.

R C van Dijk

Anmeldung Nr:
Application no.: 03102180.1
Demande no:

Anmeldetag:
Date of filing: 16.07.03
Date de dépôt:

Anmelder/Applicant(s)/Demandeur(s):

DSM IP Assets B.V.
Het Overloon 1
6411 TE Heerlen
PAYS-BAS

Bezeichnung der Erfindung/Title of the invention/Titre de l'invention:
(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.
If no title is shown please refer to the description.
Si aucun titre n'est indiqué se referer à la description.)

Method to improve taste of food or beverage with a reduced amount of total fat by addition of yeast extract and food or beverage thereof

In Anspruch genommene Priorität(en) / Priority(ies) claimed /Priorité(s) revendiquée(s)
Staat/Tag/Aktenzeichen/State/Date/File no./Pays/Date/Numéro de dépôt:

Internationale Patentklassifikation/International Patent Classification/
Classification internationale des brevets:

A23L1/00

Am Anmeldetag benannte Vertragstaaten/Contracting states designated at date of filing/Etats contractants désignées lors du dépôt:

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL
PT RO SE SI SK TR LI

METHOD TO IMPROVE TASTE OF FOOD OR BEVERAGE WITH A REDUCED AMOUNT OF TOTAL FAT BY ADDITION OF YEAST EXTRACT AND FOOD OR BEVERAGE THEREOF

This invention relates to a method for improving the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of food or beverage with a reduced amount of total fat by addition of a yeast extract. Further the invention relates to food or beverages obtainable thereof.

Fats or lipids, likewise carbohydrates and proteins, are principal and essential components of the daily human diet. Fats introduced with the diet are largely constituted of mono-, di- or triglycerol esters of fatty acids. Fatty acids can be divided, based on the structure of their hydrocarbon chain, into saturated and unsaturated fatty acids. Fats rich in saturated fatty acids can be found in food of animal origin (cream, butter, milk, meat etc cetera) while unsaturated fatty acids are usually found in food of vegetable origin (oils, margarine, etc cetera).

Fats provide the most concentrated source of energy in the diet (9 kcalories per gram). Some fatty acids are essential in the production of hormone-like substances. Moreover, fats help the body adsorb and transport the fat-soluble vitamins A, D, E and K. Fats play also a very important role in the flavour of food. Not only fats add some flavour directly to food, but they also bland flavours which are soluble in fat. Furthermore the (partial) decomposition of some types of fat during cooking is also responsible for flavour in food.

However several health organisations warn the public against an excessive introduction of total fat with the diet. High intake of total dietary fat is associated with an increased risk for obesity, some types of cancer and coronary hearth disease. These latter health problems are growing in the western society where a wealthier and more hectic lifestyle of the population is leading to an increased consumption of processed food. Processed food is often rich in total fat.

A new trend in the food industry is therefore the introduction in the market of fat-free food, low fat food and reduced fat food. Often it is also indicated whether it is referred to saturated fat or total fat. The US Food and Drug Administration (FDA) has regulated the use of such nutrient content labels in food in the US (US Food and Drug Administration, Center for Food Safety & Applied Nutrition, "A Food Labeling Guide", September 1994 (Editorial revisions June 1999)). Throughout this specification, when

referring to the FDA Food Labeling Guide, it will always be referred to the above-mentioned edition. Accordingly, nutrient content labels relative to fat content in food are described in the US Code of Federal Regulation, Title 21, Vol. 2, Sec. 101.62(b) (revised as of April 1, 2002) (abbreviated as 21 CFR 101.62(b)). Throughout this specification it will always be referred to the above-mentioned edition of the US Code of Federal Regulation, Title 21, Vol. 2. In this contexts, the label "total fat-free food" applies to food with less than 0.5 g of total fat per reference amount and per labelled serving (21 CFR 101.62(b)(1)). In the same contexts the label "Low total fat-food" means: 3 g or less of total fat per reference amount (and per 50 g if the reference amount is small) (21 CFR 101.62(b)(2)). Finally, the label "reduced total fat-food" means that the food comprises at least 25% (w/w) less total fat per reference amount than an appropriate reference food. The appropriate reference food may not be a low total fat-food (21 CFR 101.62(b)(4)). In this context the appropriate reference food is described in 21 CFR 101.13(j)(1). In this context reference amount or serving means the amount of that specific food category which is customarily consumed per eating occasion. A table indicating the reference amount customarily consumed per specific food category is given in 21 CFR 101.12(b). In 21 CFR 101.9(b)(2)(i)-(ii)-(iii) it is described how to use the reference amount to derive the serving size. The US Food and Drug Administration has also proposed a definition of "total fat" to which throughout this specification it will be adhered with. Accordingly, "total fat" is the sum of all fatty acids (saturated plus unsaturated) obtained from a total lipid extract expressed as triglycerides. It is known to those skilled in the art how to measure this value in food.

Given the importance of fat in determining the taste of food, a clear disadvantage of food with a reduced amount of total fat content is that the latter lacks the same richness of flavour than the corresponding full-fat food possesses.

A goal of the present invention is to offer a solution to this problem.

The present invention provides a method for improving the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of a food or beverage with a reduced amount of total fat by addition of a yeast extract comprising 5'-ribonucleotides. Preferably said yeast extract does not confer to the food (or beverage) any taste or specific note of the yeast extract itself or this taste/note is minimal. Yeast

extract is a composition, which comprises the soluble components extracted from yeast cells or the modified components thereof. This composition comprises at least 5'-ribonucleotides. In general, this composition also comprises amino acids, proteins, peptides, vitamins, carbohydrates and salts like phosphates.

Autolytic yeast extracts are concentrates of the soluble materials obtained from yeast after lysis of the polymeric yeast material. The active yeast enzymes are responsible for the lysis. At this purpose, strains of the genera *Saccharomyces*, *Kluyveromyces* and *Candida* can for example be used. This type of yeast extracts, which is rich in amino acids, is used in the food industry as basic taste providers. The amino acids present in the yeast extract add a bouillon-type, brothy taste to the food without adding any specific notes.

Hydrolytic yeast extracts are concentrates of the soluble materials obtained from yeast after lysis, when to the yeast suspension during lysis additional proteases, and/or peptidases and especially nucleases are added. During this process 5'-ribonucleotides of guanine (5'-GMP), uracil (5'-UMP), cytosine (5'-CMP) and adenine (5'-AMP) are formed. When adenylic deaminase is added to the mixture, 5'-AMP is transformed into 5'-inosine mono phosphate (5'-IMP). The hydrolytic yeast extracts obtained by this method are therefore rich in 5'-ribonucleotides, especially rich in 5'-GMP and 5'-IMP. Often yeast extracts are also rich in mono sodium glutamate (MSG). 5'-IMP, 5'-GMP and MSG are known for their flavour enhancing properties. They are capable of enhancing the savoury and delicious taste in certain types of food. This phenomenon is described as 'mouthfeel' or umami. The natural 5'-ribonucleotides of these yeast extracts demonstrate a synergistic effect with the glutamate present in the extract as well as in the food substrates to provide the enhanced savoury attributes to processed food. These 5'-ribonucleotides and, optionally, MSG, or yeast extracts comprising the same find their application in soups, sauces, marinades, flavour seasonings, meat, vegetables, and gravies. Ribonucleotides as for example 5'-GMP and 5'-IMP are also present as isolated compounds, i.e. not in the form of a yeast extract, and can be used as such, in the above-mentioned applications. However the latter method has the disadvantage, in respect with the use of yeast extracts comprising ribonucleotides, that the ribonucleotides need to be chemically isolated from their RNA sources.

Throughout this specification the wording "food or beverage with a reduced amount of total fat" will be used indicating thereby a food or beverage, which comprises at least 25% w/w less total fat per fixed amount of food or beverage than the

corresponding full-fat food. Said food or beverage with a reduced amount of total fat may comprise at least 50% w/w less total fat than the corresponding full-fat food. The food or beverage with a reduced amount of total fat may also comprise as less as 95 w/w, or approximately as less as 100% w/w less total fat than the corresponding full-fat product.

By corresponding full-fat food is preferably meant an "appropriate reference food" as mentioned in 21 CFR 101.62(b) and more specifically as defined in 21 CFR 101.13 (j)(1)(i)(B), and 101.13(j)(1)(ii)(B). However, in the present case, the "appropriate reference food" may be a "low total-fat food" (as described in the above-mentioned FDA Food Labelling guide and in 21 CFR 101.62(b)(2)) but not a "free total-fat food" (as described in the above-mentioned FDA Food Labelling guide and in 21 CFR 101.62(b)(1)). More preferably the "appropriate reference food" is not a low fat food.

Generally the full fat food or beverage comprises between 1-100% w/w of total fat and/or at least 10-100% of the caloric value of this food is coming from fat. Generally, the food (or beverage) with a reduced amount of total fat is a processed food and can be derived from the corresponding full-fat food or beverage by any processing, alteration, formulation or reformulation which leads to the lowering of the fat comprised therein and/or replacement of said fat with a fat replacer. Said processes and said fat replacers are known in the art.

In a first aspect, the present invention provides a method for improving the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of a food or beverage with a reduced amount of total fat by addition of a yeast extract, wherein said yeast extract comprises one or more 5'-ribonucleotide(s) in a total amount of at least 8% w/w and free amino acids, wherein said one or more 5'-ribonucleotide(s) comprises 5'-GMP and optionally 5'-IMP, all weights in the yeast extract being based on sodium chloride-free yeast extract dry matter.

The yeast extracts used in the invention are generally obtained from yeast strains with a high RNA content. By this way a high amount of 5'-ribonucleotides is generated during the hydrolytic process. Generally yeast strains are used belonging to the genera *Saccharomyces*, *Kluyveromyces* and *Candida*. Yeast strains belonging to the genus *Saccharomyces*, for example to the strain *Saccharomyces cerevisiae* are preferred. Yeast extracts derived from strains belonging to the genus *Candida*, for example to *Candida utilis*, or Torula yeast, may be characterized by a sweet taste. In the contest of

the present invention a yeast extract which does not confer to the food (or beverage) any taste or specific note typical of the yeast extract itself or where this taste/note is minimal, is preferred.

With the term "5'-ribonucleotide" it is herewith intended either the free 5'-ribonucleotide or a salt thereof. However all weight percentages of 5'-ribonucleotide contents in the yeast extract are calculated based on the disodium salt heptahydrate thereof and are based on sodium chloride-free yeast extract dry matter. Sodium chloride-free yeast extract dry matter does not mean that the yeast extract does not comprise sodium chloride. It means that the calculations are based on yeast extract dry matter only and therefore the sodium chloride contained in the yeast extract is excluded from this calculation.

Surprisingly we have found that when the yeast extract used in the method of the invention comprises free amino acids, at least 8% w/w of ribonucleotides, said ribonucleotides comprise 5'-GMP and optionally 5'-IMP, this is very beneficial to the taste and/or aroma and/or mouthfeel of a food (or beverage) with a reduced amount of total fat wherein said yeast extract is added. In particular the taste and/or aroma and/or mouthfeel of said food with a reduced amount of total fat comprising the yeast extract has more resemblance with the taste and/or aroma and/or mouthfeel of the corresponding full-fat food, i.e., the fat note in the taste and/or the fat note in the aroma and or the fat note in the mouthfeel of the food or beverage with a reduced amount of total fat comprising the yeast extract is improved.

The content of 5'-ribonucleotides in the yeast extract influences its performance in improving the taste and/or aroma and/or mouthfeel of a food or beverage with a reduced amount of total fat content. A higher amount of 5'-ribonucleotides in the yeast extract is preferred.

The yeast extract used in the method of the invention preferably comprises the one or more 5'-ribonucleotide(s) in a total amount of between 10 and 50% w/w based on sodium chloride-free yeast extract dry matter, preferably between 10 and 40% w/w, more preferably between 10 and 30% w/w.

The presence of 5'-GMP and optionally 5'-IMP in the yeast extract has a beneficial effect in improving the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of the food or beverage with reduced amount of total fat wherein it is added.

Therefore in a preferred embodiment of the invention, the yeast extract comprises 5'-GMP and 5'-IMP in a total amount of at least 4% w/w based on sodium chloride-free yeast extract dry matter, preferably between 5 and 25% w/w, more preferably between 5 and 20% w/w, most preferably between 5 and 15% w/w. Preferably the yeast extract used in the method of the invention comprises both 5'-GMP and 5'-IMP.

Preferably, the yeast extract used in the invention has a low content in free amino acids and/or a low degree of protein hydrolysis. The latter is beneficial to the taste and/or aroma and/or mouthfeel of the food or beverage with a reduced amount of total fat wherein said yeast extract is added. The degree of protein hydrolysis in the yeast extract is measured as the percentage of nitrogen belonging to primary amino groups of proteins, peptides or free amino acids in respect of the total protein as determined by the Kjeldahl nitrogen method in the yeast extract.

The yeast extract used in the method of the invention preferably has a degree of protein hydrolysis of at most 50%, preferably between 5 and 45%, more preferably between 10 and 45%, even more preferably between 20 and 45%, most preferably 30 and 45%.

We have surprisingly found that when a yeast extract having a ratio between the percentage (w/w) of free amino acids and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP of at most 3.5 is used, an optimal improving effect on the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of the food or beverage with a reduced amount of total fat is obtained without conferring to said food or beverage any brothy/bouillon/yeasty taste typical of the yeast extract or wherein said contribution is minimal. Therefore in a preferred embodiment of the invention a yeast extract is used wherein the ratio between the percentage (w/w) of free amino acids and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract is at least 0.1, preferably at least 0.2, more preferably at least 0.5 and most preferably at least 1, all weights in the yeast extract being based on sodium chloride-free yeast extract dry matter. In a preferred embodiment of the invention a yeast extract is used wherein the ratio between the percentage (w/w) of free amino acid and the percentage (w/w) of the total amount of 5'-GMP and 5'IMP in the yeast extract is at most 3.5, preferably at most 3, even more preferably at most 2.5 and most preferably at most 2, all weights in the yeast extract being based on sodium chloride-free yeast extract dry matter.

With "percentage (w/w) of the total amount of 5'-GMP and 5'-IMP" it is intended the total amount of 5'-GMP plus 5'-IMP measured as weight percentage in respect of sodium chloride free yeast extract dry matter.

With "percentage (w/w) of free amino acids" used in the ratio above it is intended the weight percentage of free amino acids in the yeast extract based on sodium chloride-free yeast extract dry matter. The amount of amino acids in the yeast extract, and consequently the weight percentage of free amino acids in the yeast extract based on sodium chloride-free yeast extract dry matter, is measured using standard HPLC methods known to those skilled in the art.

The "percentage (w/w) of protein" in the yeast extract, based on sodium chloride-free yeast extract dry matter, is calculated by determining the percentage, based on sodium chloride-free yeast extract dry matter, of the total nitrogen content as measured with the Kjeldahl method and by multiplying this percentage by 6.25 in a determined amount of yeast extract. This 6.25 is the generally accepted conversion factor from nitrogen to protein.

Surprisingly it has been found that the ratio between the percentage (w/w) of protein in the yeast extract and the percentage (w/w) of the total amount of 5'-GMP plus 5'-IMP in the yeast extract is also important in determining the effect of the yeast extract on the taste and/or aroma and/or mouthfeel of a product with a reduced amount of total fat. We have surprisingly found that when said ratio is at most 12, preferably at most 8, more preferably at most 6.5, the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of the food or beverage with a reduced amount of total fat is considerably improved and more similar to that of the corresponding full-fat product, without at the same time conferring to the food or beverage any taste typical of the yeast extract or where this taste is minimal.

Therefore in a preferred embodiment of the invention the ratio between the percentage (w/w) of protein in the yeast extract and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract, based on sodium chloride-free yeast extract dry matter, is at most 12, preferably at most 8, more preferably at most 6.5. Generally this ratio is at least 0.1, typically at least 0.5.

The yeast extracts used in the method according to the invention are preferably characterised by a low sodium chloride content. The latter is advantageous because a high content of sodium in the diet is detrimental to health. The amount of sodium chloride in the yeast extract is preferably lower than 8% w/w, preferably comprised between 0 and 7% w/w based on yeast extract dry matter, preferably between 0 and 5% w/w, more preferably between 0 and 3% w/w, even more preferably between 0 and 1.5% w/w, most preferably between 0 and 1% w/w based on yeast extract dry matter.

Generally the yeast extract used in the method of the invention comprises as well mono sodium glutamate (MSG).

When a yeast extract as above described is used in a method of the invention, the taste and/or aroma and/or mouthfeel of the food or beverage with a reduced amount of total fat is considerably improved. In particular the specific fat note in the taste and/or the specific fat note in the aroma and/or the specific fat note in the mouthfeel of the food or beverage is improved and/or enhanced. That means that when the yeast extract used in the method of the invention is applied for example in chocolate milk with reduced total fat content, its taste and/or aroma and/or mouthfeel shifts from watery, lacking fat taste, to a full-bodied fat taste and it is much more resembling to the taste and/or aroma and/or mouthfeel of the corresponding full-fat chocolate milk.

When a yeast extract wherein the ratio between the percentage (w/w) of free amino acids and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP of at most 3.5 is used, an optimal improving effect on the fat note in the the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of the food or beverage with reduced fat content is obtained without conferring to said food or beverage any brothy/bouillon or other taste typical of the yeast extract or wherein said brothy/bouillon or other taste typical of the yeast extract is minimal.

The results are even more improved when the ratio between the percentage (w/w) of protein in the yeast extract and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract is lower. For example, when yeast extract with approximately the same ratio between the percentage (w/w) of free amino acids and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP but with a different ratio between the percentage (w/w) of protein and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract were used in food or beverages with a reduced amount of total fat, the best results were observed in the yeast extract with a lower ratio

between the percentage (w/w) of protein and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP. While both yeast extracts improved the taste from a flavoured milk drink from watery, lacking fat taste, to a more full-bodied fat taste, more resembling to the taste and/or aroma and/or mouthfeel of the corresponding full-fat flavoured milk drink, the yeast extract with the lower ratio between the percentage (w/w) of protein and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP was the most clean in taste, i.e., the contribution to the taste given by the yeast extract itself was the smallest.

Yeast extracts, which are particularly preferred in the method of the invention comprise an amount of the one or more ribonucleotide(s) of 10-30% w/w, based on sodium chloride free yeast extract dry matter.

Preferably said yeast extracts comprise an amount of 5'-GMP and 5'-IMP of 5-15% w/w based on sodium chloride free yeast extract dry matter.

Preferably said yeast extracts have a ratio between the percentage (w/w) of free amino acids and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP, all weights in the yeast extract being based on sodium chloride-free yeast extract dry matter, of at most 2 and generally at least 1.

Preferably said yeast extracts have a ratio between the percentage (w/w) of protein in the yeast extract and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract, all weights in the yeast extract being based on sodium chloride-free yeast extract dry matter, of at most 12.

Yeast extracts belonging to the above-mentioned category are for example the yeast extracts Maxarome Plus LS® (DSM-Delft-The Netherlands) and Maxarome Premium LS® (DSM-Delft-The Netherlands).

In food or beverages with a reduced amount of total fat comprising said yeast extracts the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of the food or beverages is improved. Moreover, said fat note in the taste and/or said fat note in the aroma and/or said fat note in the mouthfeel of the food or beverages is much more similar to the corresponding full-fat product. At the same time the contribution given by the yeast extract own taste/note to the taste and/or aroma and/or mouthfeel of the food or beverage is (almost) absent. A yeast extract, which is more preferred in the method of the invention, is a yeast extract wherein the ratio between the percentage (w/w) of protein in the yeast extract and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract, all weights in the yeast extract being based on sodium chloride-

free yeast extract dry matter, is at most 6.5. An example thereof is the yeast extract Maxarome Premium LS® (DSM-Delft-The Netherlands). In this case an optimal improvement of the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of the food or beverage with a reduced amount of total fat comprising said yeast extract is observed while the contribution of the yeast extract own taste/note to the taste and/or aroma and/or mouthfeel of the food or beverage is practically absent.

The amount of yeast extract used in the method of the invention will largely depend on the food application and on the amount of nucleotides in the yeast extract. This amount may be determined by those skilled in the art. Generally an amount of yeast extract will be used between 0.0001% w/w and 5% w/w relative to the food or beverage. Preferably an amount of yeast extract between 0.001-1% w/w is used, more preferably between 0.001-0.1% w/w relative to the food, most preferably between 0.001-0.01% w/w relative to the food is used.

Another goal of the invention is to provide food or beverages with a reduced amount of total fat obtained by this method wherein the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel is improved.

Therefore, the invention provides a food or beverage obtainable by a method of the invention with a reduced amount of total fat wherein the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel is improved. Said food or beverage has a taste which is very resembling of the taste and/or aroma and/or mouthfeel of the corresponding full-fat food or beverage.

The choice of said food or beverage is not limited as far as said food or beverage with a reduced amount of total fat and said corresponding full-fat food or beverage fulfil the requirements mentioned above. Preferably said food or beverage is not a vegetable or fruit or juice derivable thereof. Preferably said food or beverage is not a carbonated drink. Preferably said food or beverage is not a meat product.

Preferably said food products belong to the category of dairy food product, fat or oil products, bakery products, salad dressings, confectionary products.

In a preferred embodiment of the invention, the food or beverage with a reduced amount of total fat is a dairy food. Examples thereof are milk, flavoured milk like for example chocolate milk, yoghurt, cream, sour cream, sour milk, cheese, ice cream, frozen dessert with a reduced amount of total fat.

In another preferred embodiment the food or beverage with a reduced amount of total fat is a food or beverage with a reduced amount of total fat which corresponding full fat food or beverage belongs to the category of fat and oils. Products that belong to the category of fat or oils derive most of their caloric value from fat, generally at least 70-80%, usually up to 100% of their caloric value is derived from fat. Generally said food products are also very rich in total fat. Generally said products comprise at least 70% of total fat. Examples of said products are butter, margarine, mayonnaise.

Some products like salad dressings comprise fat/oils and/or dairy products.

Bakery products may comprise fats or oils and/or dairy products. Said fat or oils and/or dairy products may be replaced in said product by the corresponding fat or oils and/or dairy products with a reduced amount of total fat, yielding salad dressings or bakery products with a reduced amount of total fat.

Therefore in a preferred embodiment food or beverages according to the invention are bakery products with a reduced amount of total fat. In another preferred embodiment the food or beverage is a salad dressing with a reduced amount of total fat. Other preferred products are confectionary products, like for example chocolate, candies, with a reduced amount of total fat.

The invention will now be illustrated by some examples, which however are not intended to be limiting.

Example 1

In this example the effects of the addition of yeast extracts on a chocolate milk beverage with a reduced amount of total fat are compared. Said yeast extracts comprise at least 8% w/w of 5'-ribonucleotides, 5'-IMP+5'-GMP and free amino acid, and have different ratios between the percentage (w/w) of free amino acids and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP, and between the percentage (w/w) of protein in the yeast extract and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP, respectively. A yeast extract not comprising 5'-ribonucleotides is also tested.

Ingredients

Maxarome Plus LS powder* (DSM-Delft-The Netherlands)

Maxarome Premium LS powder** (DSM-Delft-The Netherlands)

KRIT*** (Ohly, Marl, Germany)
KAT**** (Ohly, Marl, Germany)
Halfvolle chocomel (Nutricia drinks, Zoetermeer) (chocolate milk drink with reduced amount of total fat, total fat 1.8 g/100 ml)
Chocomel (Nutricia drinks, Zoetermeer) (chocolate milk drink with full-fat content, 2.7 g/100 ml total fat, total caloric value: 90 kcal)
Water

*Maxarome Plus LS powder is a yeast extract comprising 13% w/w of 5'-ribonucleotides, 6.5% w/w of 5'-IMP + 5'-GMP, 11.7% w/w of free amino acids, 73% w/w protein, these percentages all based on salt free yeast extract dry matter, 0.8% w/w of NaCl, a degree of protein hydrolysis of 34%. The ratio between the percentage (w/w) of free amino acids and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract is 1.8. The ratio between the percentage (w/w) of protein in the yeast extract and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract is 11.2.

**Maxarome Premium LS powder is a yeast extract comprising 24% w/w of 5'-ribonucleotides, 12% w/w of 5'-IMP + 5'-GMP, 17.7% w/w of free amino acids, 59 % w/w protein, these percentages all based on salt free yeast extract dry matter, 0.8% w/w of NaCl, a degree of protein hydrolysis of 43%. The ratio between the percentage (w/w) of free amino acids and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract is 1.48. The ratio between the percentage (w/w) of protein in the yeast extract and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract is 4.92.

***KRIT is a yeast extract comprising 8.6% w/w of total 5'-ribonucleotides, 4.3% w/w 5'-GMP + 5'-IMP, 16.3% w/w of free amino acids, these percentages based on salt free yeast extract dry matter, 12% NaCl, and having a degree of protein hydrolysis of 38%. The ratio between the percentage (w/w) of free amino acids and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract is 3.80. The ratio between the percentage (w/w) of protein in the yeast extract and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract is 16.51.

****KAT is a yeast extract comprising 44.6% w/w of free amino acids, these percentage based on salt free yeast extract dry matter, 1% NaCl, and having a degree of protein hydrolysis of 57%.

The samples reported in table 1 were prepared by adding the proper amount of a concentrated solution of yeast extract in water to 100 g of chocolate milk with reduced amount of total fat. The same dilution was realised in all samples by addition of water when necessary. Blank 1 (chocolate milk drink with reduced amount of total fat) and blank 2 (chocolate milk drink with full fat content), respectively, where prepared by addition of water to 100 g of sample in order to obtain the same dilution as in the samples comprising yeast extract.

The amount of 5'-ribonucleotides in the samples comprising Maxarome Plus, Maxarome Premium and KRIT was substantially the same.

A panel of 4 experienced taste provers in the tasting of foodstuff tested the blank samples and those containing the yeast extracts.

The results are reported in table 1.

Table 1

Type yeast extract	% w/w yeast extract relative to food	Improvement of fat note in taste, aroma, mouthfeel in respect of reduced fat blank 1	Similarity with taste, aroma, mouthfeel of full fat blank 2	Yeasty taste
Maxarome Plus	0.0132	++	(+)++	Absent
Maxarome Premium	0.0072	+++	+++	Absent
KRIT	0.02	+	+	Modest
KAT	0.02	-	-	Moderate

*With yeasty taste it is herewith intended the contribution of the yeast extract own taste and/or note to the overall taste of the food.

The number of "+" in the table indicates the degree of improvement of taste in respect with blank 1 or the degree of similarity with taste of blank 2. The sign "-" in the 3rd or 4th column indicates that the yeast extract has no effect

Table 1 shows that the best results in this application regarding improvement of fat note in the taste and/or fat note in the aroma and/or fat note in the mouthfeel in respect of the chocolate milk with reduced amount of total fat and similarity with the taste and/or aroma and/or mouthfeel of the corresponding full-fat product are obtained with Maxarome Premium, followed by Maxarome Plus and KRIT. The contribution of the yeast extract own taste and/or note to the overall taste of the food was absent in Maxarome Premium and in Maxarome Plus. A slight bouillon/yeasty taste could be noticed for KRIT, and a more intense bouillon/yeasty taste could be noticed for KAT. KAT had no effect on improvement of taste of the corresponding sample.

Example 2

In this experiment the yeast extracts used in example 1 were tested on a flavoured milk drink with full-fat and with reduced amount of total fat, respectively.

Ingredients

Maxarome Plus LS powder* (DSM-Delft-The Netherlands)

Maxarome Premium LS powder** (DSM-Delft-The Netherlands)

KRIT*** (Ohly, Marl, Germany)

KAT**** (Ohly, Marl, Germany)

"Milk & Fruit light", orange taste, (Friesche vlag-Ede) (flavoured milk, product with reduced fat content, total fat ~0 g/100 ml)

"Milk & Fruit", orange taste, (Friesche vlag-Ede) (flavoured milk, full-fat product, total fat 1 g/100 ml, total caloric value: 70 kcal)

The amount of 5'-ribonucleotides in the samples comprising Maxarome Plus, Maxarome Premium and KRIT was substantially the same.

In a way analogous to that described in experiment 1, samples comprising the yeast extracts of example 1 and the blank samples (Blank 1: Milk & Fruit, light; Blank 2: Milk & Fruit full-fat) were prepared. The concentrations of the samples are reported in table 2.

A panel of 4 experienced taste provers in the tasting of foodstuff tested the blank samples and those containing the yeast extracts. The results thereof are also reported in table 2.

Table 2

Type yeast extract	% w/w yeast extract relative to food	Improvement of fat note in taste, aroma, mouthfeel in respect of reduced fat blank 1	Similarity with taste, aroma, mouthfeel of full fat blank 2	Yeasty taste
Maxarome Plus	0.0132	++	++	Almost absent
Maxarome Premium	0.0072	+++	+++	Absent
KRIT	0.02	+	+	Modest
KAT	0.02	-	-	Moderate

Legend like in Table 1

Likewise in example 1 and as reported in table 2, the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel in the sample comprising Maxarome Premium LS was the most improved in respect with the reduced fat Blank 1 and its taste and/or aroma and/or mouthfeel was the most similar to that of the full fat blank 2, followed by the samples comprising Maxarome Plus and KRIT, in this order. The contribution of the yeast extract own taste and/or note to the overall taste and/or aroma and/or mouthfeel of the food was absent in Maxarome Premium and almost absent in Maxarome Plus. A slight yeasty taste could be noticed for KRIT, and a more intense yeasty taste could be noticed for KAT. KAT had no effect on improvement of taste of the corresponding sample.

Example 3

In this experiment the effect of the concentration of Maxarome Premium LS yeast extract on the flavoured milk with a reduced amount of total fat of example 2 was tested.

In a way analogous to that described in example 1, samples comprising different concentrations of Maxarome Premium LS in "Milk & Fruit light", were prepared and tested in comparison with the blank samples 1 and 2 of example 2, by a panel of 4 experienced taste provers. The results are reported in table 3.

Table 3

Sample	Yeast extract relative to food (% w/w)	Improvement of fat note in taste, aroma, mouthfeel in respect of reduced fat blank 1	Similarity with taste, aroma, mouthfeel of full fat blank 2
1	0.0018	+	+
2	0.0036	++	++
3	0.00722	+++	+++
4	0.0144	*	*
5	0.02	*	*

Legend like in Table 1 except for:
*See text.

It was observed that in sample (1)-(3) the taste and/or aroma and/or mouthfeel of the flavoured milk drink comprising the yeast extract is improved in respect with the reduced fat blank 1 and getting closer to the taste of the full fat blank 2. The better taste improvement is observed with sample (3). *Sample (4) has a sweet (after)taste and the

effect of the yeast extract on the taste is a little overdone, the overall taste being less balanced. *Sample (5) has a taste which is off-balanced, indicating that the dosage of the yeast extract in this sample is too high.

This example also shows that the skilled person can easily determine the effective amount of yeast extract needed according to the present invention in a flavored drink with a reduced amount of total fat in this case or for a food or beverage product with a reduced amount of total fat in general.

CLAIMS

1. Method for improving the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of a food or beverage with a reduced amount of total fat by addition of a yeast extract, wherein said yeast extract comprises one or more 5'-ribonucleotide(s) in a total amount of at least 8% w/w and free amino acids, wherein said one or more 5'-ribonucleotide(s) comprises 5'-GMP and optionally 5'-IMP, all weights in the yeast extract being based on sodium chloride-free yeast extract dry matter.
2. A method according to claim 1 wherein said yeast extract comprises the one or more 5'-ribonucleotide(s) in a total amount of between 10 and 50% w/w based on sodium chloride-free yeast extract dry matter, preferably between 10 and 40% w/w, more preferably between 10 and 30% w/w.
3. A method according claims 1 or 2 wherein the yeast extract comprises 5'-GMP and 5'-IMP in a total amount of at least 4%w/w based on sodium chloride-free yeast extract dry matter, preferably between 5 and 25% w/w, more preferably between 5 and 20% w/w, most preferably between 5 and 15% w/w.
4. A method according to any one of claims 1 to 3 wherein the degree of protein hydrolysis in said yeast extract is at most 50%, preferably between 5 and 45%, more preferably between 10 and 45%, even more preferably between 20 and 45%, and most preferably between 30 and 45%.
5. The method according to any one of claims 1 to 4, wherein the ratio between the percentage (w/w) of free amino acids and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract is at most 3.5, all weights in the yeast extract being based on sodium chloride-free yeast extract dry matter, preferably said ratio is at least 0.1, more preferably at least 0.2, even more preferably at least 0.5 and most preferably at least 1 and/or this ratio is at most 3, preferably at most 2.5 and most preferably at most 2.
6. A method according to any one of claims 1 to 5 wherein ratio between the percentage (w/w) of protein in the yeast extract and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract, all weights in the yeast extract being based on sodium chloride-free yeast extract dry matter, is at most 12, preferably at most 8, more preferably at most 6.5.

7. A method according to any one of claims 1 to 6 wherein the yeast extract comprises an amount of sodium chloride of at most 8% w/w, preferably comprised between 0 and 7% w/w, preferably between 0 and 5% w/w, more preferably between 0 and 3% w/w, even more preferably between 0 and 1.5% w/w, and most preferably between 0 and 1% w/w based on yeast extract dry matter.
8. A Food (or beverage) with a reduced amount of total fat having an improved taste and/or aroma and/or mouthfeel obtainable by the method of any one of claims 1 to 7.
9. A food or beverage according to claim 8, which is a dairy product.
10. A food or beverage according to claim 8, which is a bakery product.
11. A food or beverage according to claim 8, which is a fat or oil with a reduced amount of total fat.

ABSTRACT

The present invention discloses a method for improving the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of a food or beverage with a reduced amount of total fat by addition of a yeast extract comprising at least 8% w/w of one or more ribonucleotides, comprising free amino acid and wherein the one or more 5'-ribonucleotides comprise 5'-GMP and optionally 5'-IMP, all weights in the yeast extract being based on sodium chloride free yeast extract dry matter.

The fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of the food with a reduced amount of total fat comprising the above-mentioned yeast extracts has more resemblance with the taste and/or aroma and/or mouthfeel of the corresponding full-fat product.

Preferably a yeast extract having a ratio between the percentage (w/w) of free amino acids and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP of at most 3.5 is used, In the latter case, an optimal improving effect on the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of the food or beverage with a reduced amount of total fat is obtained without conferring to said food or beverage any brothy/bouillon or yeasty taste typical of the yeast extract or where this component is minimal.

Preferably, a yeast extract with a ratio between the percentage (w/w) of protein in the yeast extract and the percentage (w/w) of the total amount of 5'-GMP and 5'-IMP in the yeast extract at most 12. Also in this case the fat note in the taste and/or the fat note in the aroma and/or the fat note in the mouthfeel of the food or beverage with a reduced amount of total fat is considerably improved and more similar to that of the corresponding full-fat product, without at the same time conferring to the food or beverage any taste or note typical of the yeast extract or where this component is minimal.

This Page is Inserted by IFW Indexing and Scanning Operations and is not part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☑ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.